Countermeasure for Managing Interpersonal Conflicts in Space: A Continuation Study

Completed Technology Project (2009 - 2013)

Project Introduction

Some amount of interpersonal conflict is expected on long-duration (LD) space missions, whether between crewmembers or between the crew and the ground. Severe conflicts, however, can interfere with mission success and even safety.

1. THE PRIMARY DELIVERABLE IS A COUNTERMEASURE TO HELP CREWS MANAGE INTERPERSONAL CONFLICT. We have produced an interactive media intervention program to assist persons to manage real, ongoing conflicts on LD missions. This intervention is based on cognitive-behavioral therapy and is designed to help individuals to: A) work out strategies to manage the conflict, and B) maintain good psychosocial/mental wellbeing and good work productivity despite the conflict, via the assistance of a coach, on computer.

2. A SECOND DELIVERABLE IS PRELIMINARY DATA ON THE USABILITY, ACCEPTABILITY, AND EFFECTIVENESS OF THE COUNTERMEASURE IN FIREFIGHTERS. We conducted an open trial to obtain these data using firefighters (a population analogous to astronauts) who are in ongoing conflicts. This open trial also enabled us to develop and assess our procedures and instruments for data collection, and estimate effect size, in preparation for a future randomized controlled trial. THIS APPEARS TO BE THE FIRST STANDARDIZED INTERVENTION (SELF-GUIDED OR OTHERWISE) TO BE EVALUATED FOR THE MANAGEMENT OF WORKPLACE CONFLICTS BETWEEN PEERS IN ANY INDUSTRY. This interactive media program rounds out a suite of assessment, intervention, and training tools for long-duration flyers, all accessible via a single portal: the Virtual Space Station (see Carter et al., 2005). Other major resources in the Virtual Space Station developed through NSBRI (National Space Biomedical Research Institute) support include an intervention for depression, an intervention for chronic stress, and self-assessment of depression and conflict with tailored feedback.

Year 4 involved the design of a methodology to collect data from firefighters who would use the program across the United States. The process involved the executable program bundling and sending data to a HIPAA-compliant cloud server and the subsequent transfer of that data to a local server behind the firewall at Partners Healthcare. This year also involved the programming of a web-based assessment for completion of pre- and post-intervention. Finally, the conflict management program was evaluated with a sample of firefighters. Throughout, we have worked closely with NASA flight surgeons, plus the Houston Fire Department, the Phoenix Fire Department, and the San Diego Fire Department.

UNIQUE ASPECTS OF THIS STUDY:

1. This software appears to be the FIRST COMPUTER-AUTOMATED BEHAVIORAL INTERVENTION THAT TAILORS THE INTERVENTION COMPONENTS TO THE USER'S NEEDS. Prior computer-automated treatments have provided the same clinical components to all users, without regard to

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whether the user needed them or not. This makes our intervention highly tailored to the unique status of the individual and also highly efficient, since users are only presented with content that is applicable to them.

2. TAILORING THE PROGRAM TO USERS FOLLOWS A UNIQUE PROCESS. We have developed a set of algorithms that approximates an item-response procedure to decide whether users should receive domains of interventional content or not. Computer-adaptive testing is performed in the first intervention setting to create a treatment plan to help him or her manage the interpersonal conflict. Users answer questions from validated measures to determine whether or not a given content area will be presented to them. The assessments are only used to make a binary decision of whether a user should receive that interventional content. Once the user's responses reach a numerical threshold (or cannot reach it), the program ceases asking questions in that domain and moves to the next. This application of computer-adaptive testing technology reduces the amount of questions needed to be answered by users to tailor their treatment, making the intervention more time-efficient.

3. This appears to be the FIRST INTERACTIVE MEDIA PROGRAM EVER DEVELOPED TO ASSIST PERSONS TO FORMULATE AN ACTION PLAN TO MANAGE A SPECIFIC WORKPLACE CONFLICT.

4. The planned evaluation of the program will be THE FIRST TO EVALUATE ANY INTERVENTION FOR CONFLICT BETWEEN CO-WORKERS ACROSS MULTIPLE SETTINGS IN ANY INDUSTRY. Current computer-delivered behavioral interventions have generally guided users through a pre-determined set of activities designed to address a presenting problem. This study advances the field of automated, computer-based interventions by tailoring the contents of the intervention—and even the clinical topics presented—to the user's needs. The conflict intervention program delivers a core set of interventions to assist users with their interpersonal conflict: problem solving, cognitive restructuring, and negotiation skills training. In addition, a series of empirically supported self-assessments also evaluate whether a user should receive content to improve his or her assertiveness, ability to manage anger, or empathy (the ability to understand the other party's point of view and emotional state). With this approach, the users receive content tailored to their particular needs, and they don't waste time on unnecessary content. Persons involved in intense workplace conflicts may also experience problems with sleep, anxiety, depression, alcohol abuse, stress, rumination, and others. This program incorporates empirically supported measures of these problems to determine whether users would benefit from content on any or all of these seven topics. If so, the program provides optional content on the topic area.

Finally, to date, research on workgroup conflict has generally been phenomenological and descriptive. Despite the ubiquity of conflict between

Organizational Responsibility

Responsible Mission Directorate:

Space Operations Mission Directorate (SOMD)

Lead Organization:

National Space Biomedical Research Institute (NSBRI)

Responsible Program:

Human Spaceflight Capabilities

Project Management

Program Director:

David K Baumann

Principal Investigator:

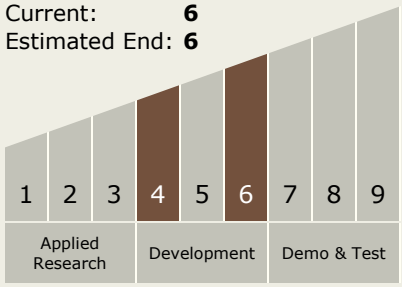
James A Cartreine

Co-Investigators:

Leonard Greenhalgh
Gary E Beven
Mark Hegel

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



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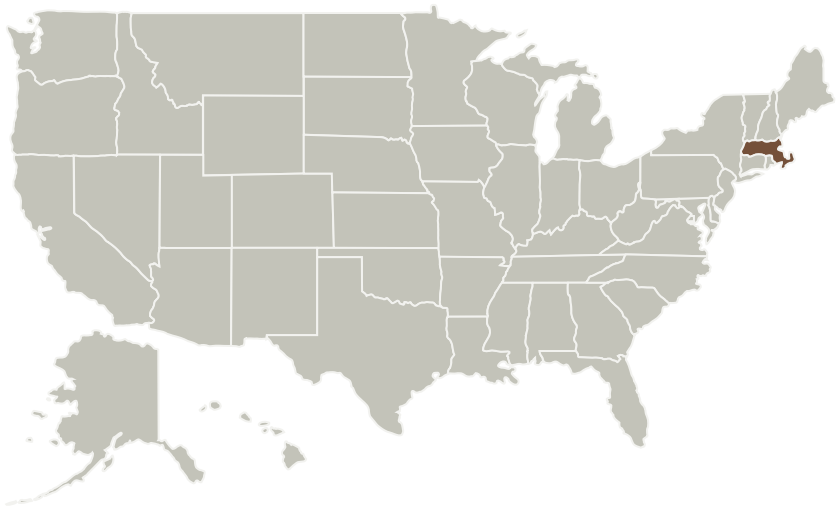
co-workers across all industries, and the potentially large costs of conflict in productivity, NO PRIOR STUDIES HAVE EMPIRICALLY EVALUATED A STANDARDIZED INTERVENTION FOR WORKPLACE CONFLICTS.

Anticipated Benefits

Workplace conflict is ubiquitous. Clearly, if effective, this countermeasure could help firefighters and other first responders. It could also be adapted for use in isolated operational environments, such as polar research stations, submarines, commercial ships, oilrigs, and underwater research stations. However, even greater value would be derived by making this and similar programs available to the public in workplaces and other settings such as secondary schools, social services offices, places of worship, military bases, prisons, public health and mental health centers, and eventually at home or in any location, through broadband Internet.

Primary U.S. Work Locations and Key Partners



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.3 Human Health and Performance
    - TX06.3.3 Behavioral Health and Performance

Target Destinations

The Moon, Mars

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Organizations Performing Work	Role	Type	Location
National Space Biomedical Research Institute(NSBRI)	Lead Organization	Industry	Houston, Texas
Brigham And Women's Hospital, Inc.	Supporting Organization	Industry	Boston, Massachusetts
Dartmouth College	Supporting Organization	Academia	Hanover, New Hampshire

Primary U.S. Work Locations
Massachusetts

Project Transitions

September 2009: Project Start

October 2013: Closed out

Closeout Summary: At this point, we have accomplished the aim of developing an interactive media program to assist lon g-duration space crews to manage specific, ongoing conflicts that are substantially interfering with work or well-being. The aim of collecting preliminary data about the program's efficacy and usability has also been completed. This program rounds out the Virtual Space Station suite of clinically validated interactive media programs to assist astronauts to manage the psy chosocial challenges of long-duration missions. The Virtual Space Station was designed specifically for astronauts to provide tools that can be used autonomously to prevent, detect, assess, and manage psychosocial wellbeing and maintain optimal p erformance. The Virtual Space Station is the product of 12 years of research to develop and clinically validate programs cus tomized for astronauts to manage depression, chronic stress, and interpersonal conflict. The Virtual Space Station portal, its elf, was validated in a study of its usability, acceptability, and credibility to astronauts, at NASA-Johnson Space Center. A p oster presentation that was made during the current project summarizes this astronaut data.

Stories

Articles in Peer-reviewed Journals
(https://techport.nasa.gov/file/64481)

Articles in Peer-reviewed Journals
(https://techport.nasa.gov/file/64485)

Articles in Peer-reviewed Journals
(https://techport.nasa.gov/file/64483)

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(https://techport.nasa.gov/file/64480)

Articles in Peer-reviewed Journals
(https://techport.nasa.gov/file/64484)

Significant Media Coverage
(https://techport.nasa.gov/file/64488)

Significant Media Coverage
(https://techport.nasa.gov/file/64486)

Project Website:

https://taskbook.nasaprs.com